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GUIDELINES FOR SAFEGUARDING MAINTANENCE HAEMODIALYSIS PATIENT UNDERGOING COVID -19 INFECTION- A REVIEW

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ABSTRACT

Coronavirus Disease-19 (COVID- 19) is a pandemic that has outbroken in whole nation in the year 2019. The rapid spread of this disease has disturbed the whole stability of the lives of the people as it has become the core cause of mortality these days. The disease is found to be a droplet infection and the main cause of spreading from an infected to a non infected person is through droplets arising during coughing sneezing etc. according to WHO the covid-19 is found to be more dangerous for individuals who have commorbidies. One among the high risk population who are very vulnerable to COVID -19 is Hemodialysis (HD) patients Or End Stage Renal Disease (ESRD) patients. These patients must be given atmost care as COVID -19 can be life threatening for them. Since hemodialysis patients need to visit hospital frequently (around 3 times a in some condition) which increase their exposure to various infections they require special attention. In this review we are discussing about the safety measures that should be followed by both COVID and non- COVID patients undergoing hemodialysis along with the measures that should be taken by the health care personnel and authorities doing the hemodialysis procedure to reduce the risk and safeguard the health of patients undergoing hemodialysis.

KEYWORDS: COVID-19, SARS-CoV-2, hemodialysis, End Stage Renal Disease, health care personnel.

INTRODUCTION

COVID-19 is a disease emerged in December 2019 caused by SARS-CoV-2. By late 2019, a group of patients experienced unexplained Pneumonia and it was found that they were infected by novel beta-coronavirus, now known as severe acute respiratory syndrome coronavirus 2. By the time any precaution could be taken for preventing the spread of COVID -19 it was found that more than half of the population have already been infected by this disease. The frequency of hospitalizations are multiplying day by day. Many approaches have been adopted by nations. One of the important approach among them is “flatten the curve”, which states to reduce the peak demand of healthcare resources. It was found that the cheapest way of preventing the spread of this disease was found to be proper wearing of mask, proper sanitization and most importantly social distancing. The clinical characteristic evaluation of COVID -19 among different age group suggest that disease severity varies with age especially among old age.

One of the most vulnerable population to COVID 19 is dialysis patient due to significant comorbidities, impaired immune function, frequent encounters at health care centers with other patients and staff, the physical proximity of patients during HD, and transportation to and from HD sessions and frequent interactions that may occur as a part of their therapy. Due to this disease state and consequences of the disease dialysis units are frequently prone to COVID 19 outbreaks and because of which the patients with COVID19 undergoing hemodialysis may experience higher morbidity and mortality compaired to hemodialysis patient without COVID-19.

There are several protocols and guidelines that have been developed by nephrology societies and other individual groups to reduce transmission and outbreaks of COVID-19 in dialysis units. The prevention and control measures for dialysis unit have been extracted from respiratory viral transmission studies in general population. For patient who are immunocompetent and diagnosed with COVID-19 droplet isolation and maintenance of social distance for 10 days from symptom onset is recommended. There are various studies that support these recommendations which states shedding of cultivatable virus with viral copy number estimated by

the cycle threshold (Ct) value from SARS-CoV-2 polymerase chain reaction (PCR) nucleic acid detection tests which is a standard for diagnosing COVID-19. In patient with appreciable immune system Ct value would rise above 25 to 30 within 7 to 10 days after initiation of symptoms, however due to the sensitivity of PCR assay, it may remain as positive for weeks which states that patient shedding SARSCoV-2 nucleic acid for a long time without viable virus may not be considered as infectious. Hence COVID-19 PCR should not be considered as a standard guide for public health and hospital isolation protocol for general population. In contrast immunosuppressed patient affected by COVID - 19 may remain infectious even for longer period that is upto 2 months and thus they require special consideration. Patient end stage kidney disease may have both innate and adaptive immune system impaired and hence may result in an increased risk of all possible types of infections. The may also show an unclear response towards vaccination. There is no clearly established isolation protocol for patient with COVID-19 dialysis patients. Considering the situation of prolonged shedding of noninfectious viral nucleic acid, prolonged isolation become impractical.

COVID-19 AND HEMODIALYSIS

Coronavirus disease 2019 (COVID-19) is a respiratory illness that spreads from one person to another through droplets expelled during coughing and sneezing by the patient. It can also be transmitted through direct contact and fecal contamination. Aerosol transmission can lead to transmission in some case.

COVID 19 had made a huge impact on hemodialysis patients. Due to significant comorbidities, impaired immune function, frequent encounters at health care centers with other patients and staff, the physical proximity of patients during HD, and transportation to and from HD sessions and frequent interactions that may occur as a part of their therapy these patients have become more vulnerable to COVID-19. It has become a challenge for patients with end-stage kidney disease and for people who have to undergo hemodialysis frequently. HD patients cannot practice social.

Most frequently it is seen that the patients undergoing hemodialysis frequently that is two or three times a week usually stay relatively close to each other and arrive in groups during the treatment time. The most important factor that make ESRD patients at greater risk is their comorbid disease. It is infact concluded that the incidence of COVID-19 have increased the mortality rate among the ESKD undergoing hemodialysis.

MEASURES AND ALGORITHMS FOR PREVENTION

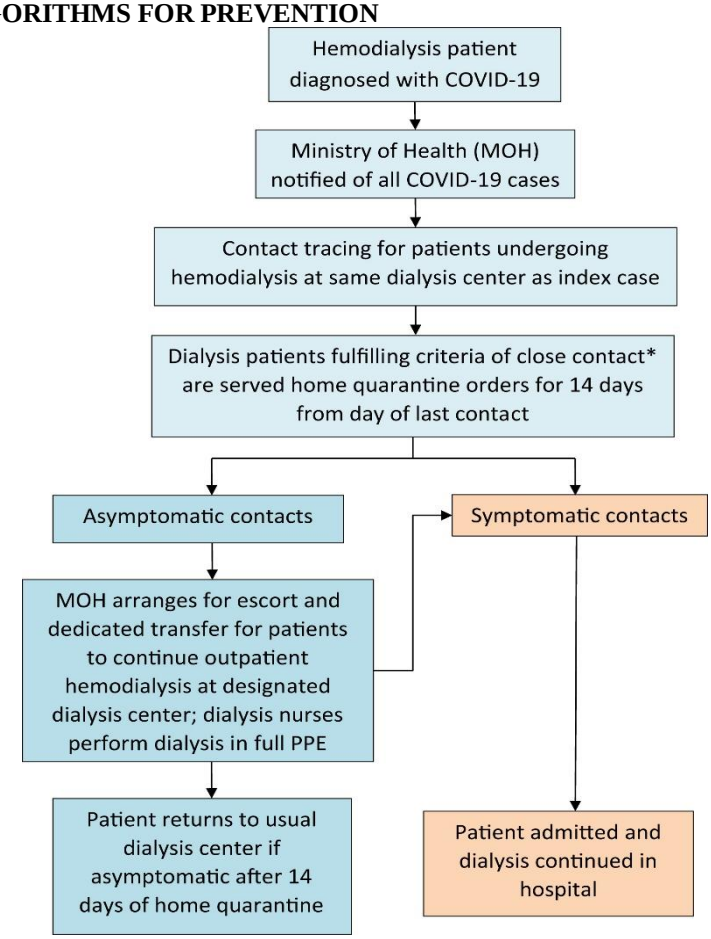


Figure 1: algorithm for management of hemodialysis patient found COVID positive.

MEASURES FOR PATIENT PROTECTION

The first and prime important measure to be taken is social distancing. Measure should be taken to achieve this goal. Appropriate methods for maintain the required social distancing for the dialysis patient must be found out. The patient must be recommended and asked to take private transport if possible to avoid public exposure and avoid public transport completely if possible. If patients are not able to drive by themselves ask them to rely on their relatives or any family friends for the private transportation. If patients are relying on shared transport they are asked to reduce the number of persons they are travelling with. For patients to maintain social distance in hospital premise the chairs should be placed 1.5-2 meters apart as a group of people might be given the time slot at the same time for dialysis. Patients might be given instructions not to go close near other patients or other faculities other than those who are doing the procedure. The patients must be asked to wear mask during connection of the dialysis tubing to the arteriovenous fistula, loop graft, or tunneled central line. Patients must be asked not to remove mask unless they reach home from hospitals. Drivers incharge of transportation of HD patients were strictly asked to wear mask. Patients who use shared transportation were attended by the same nurse and faculities and given the treatment in the same place. Adherence to these instruction can bring a huge change and may help to trace contacts of patients if anyone appear to be positive.

The next major goal is to detect the infected person as soon as possible. This should be taken seriously and done precisely to avoid cluster formation and for minimizing further transmission. Various approaches for finding of cases are shown in the table.

The patient must be given a thorough and detailed instruction about the disease, its early and possibly hidden symptoms, its way of transmission, possible precautions to be taken to prevent the transmission which may include maintaining personal hygiene, covering nose and mouth while coughing or sneezing, avoiding close contact with other people, social distancing etc and importance of early detection. If possible all the hemodialysis patients must be given easily understandable leaflets containing all the necessary information for the early diagnosis. Any patients feeling any sort of uneasiness or any sort of mild symptoms must be asked to inform the doctor or the respective health authority by phone itself. If the initial mild symptom is experienced by the patient on a non- dialysis day the patient must be screened properly and the required test must be done as soon as possible inorder to provide the report before the next dialysis day. If the symptoms are noted on the dialysis day the patient must be diverted to the emergency department for the testing, using nasopharyngeal swab. To minimize the risk a chest CT is taken at this time to avoid further consequences.

Checking the temperature of each and every person at the entry of the dialysis center can help to some extend to minimize the risk. Patient suspected with COVID-19 are deviated to the emergency department.

During each dialysis session the patient is asked in detail about any sort of exposure like fever cough or contact with any suspected person etc.

The next important goal is to minimize hospitalization of patients. The patients if suspected with COVID-19 must be given suitable ambulatory care. This may require an enquiry about the patients background, home situation to understand the possibility of isolation, transportation facility in emergency and possibility of dialysis if required. Critical patients should be admitted and given focused therapeutic care including ventilator support.

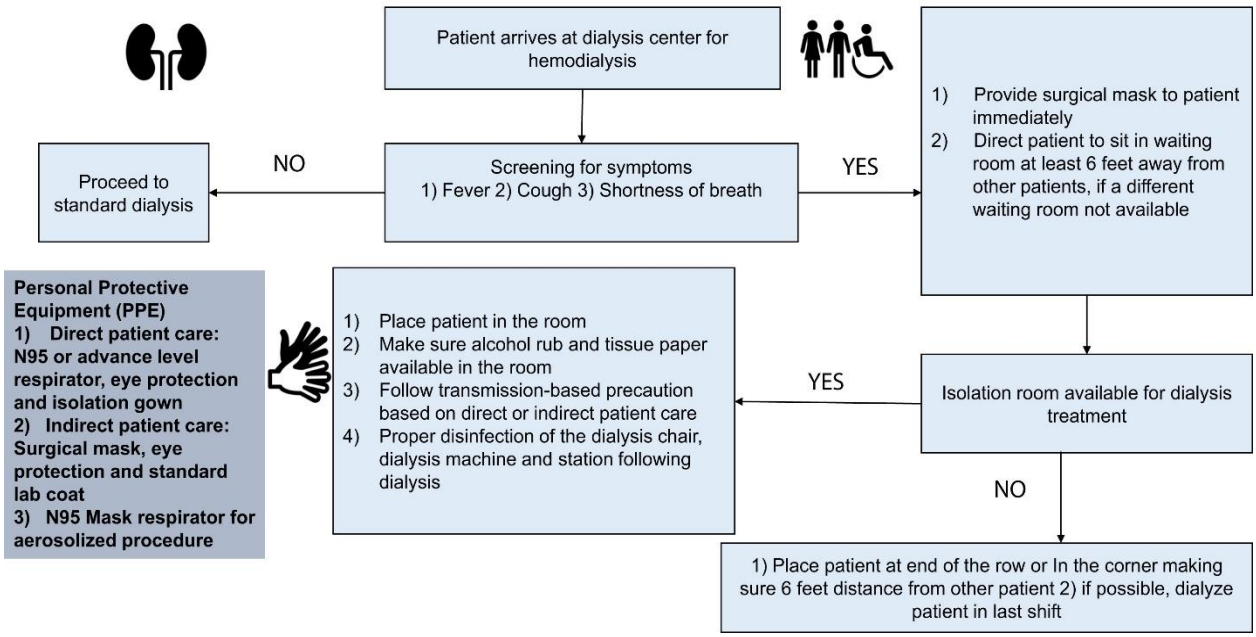


Figure 2: Care given to COVID positive hemodialysis patient.

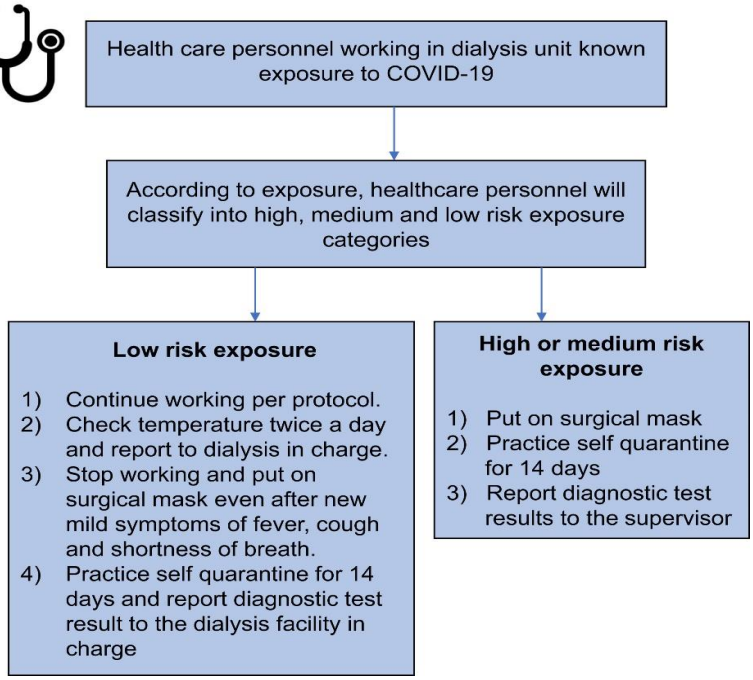
MEASURES FOR HEALTH CARE PERSONNEL PROTECTION

An important group that must be considered while assuring safety of hemodialysis patient is health care personnels who are the front line caregivers and care takers of the patients. Considering the health of health care personnel is of prime importance in minimizing the spreading of the disease. Al health care personnels must wear PPE kits along with surgical masks and gloves during their shifts. All health care personnels must be provided with sufficient and necessary sick leaves so that they can stay at home and are not forced to come for work even if they are sick.

The health care personnels must be well educated about the hand hygiene techniques that should be followed before and after visiting a patient.

If prone to an exposure the health care personnel must inform their superior about the exposure its intensity and if found symptomatic should stop their work.

The exposures can be mainly divided into three. High risk exposure can be explained as prolonged close contact with COVID-19 infected person without wearing PPE kit, mask and gloves. Medium risk exposure may include close contact with the infected person while while wearing mask. Low risk may be defined as those who have a brief interaction with the infected person while wearing a face mask or respirator. Health care personals who are categoriesed under high or medium exposure should be instructed for self-quarantine for 14 days. Health care personal categorized under low-risk exposure should be allowed to continue their work and self-monitor for symptoms, including twice-a-day temperature checks, with instructions to stop working if fever or respiratory symptoms develop. If found symptomatic they should go for self-quarantine for 14 days.



Fgure 3: Classification of health care personnel screening based on their exposure to COVID positive patient.

For discontinuing home isolation the health care personnels may follow symptom based and test based strategy.

A person with symptoms and positive COVID-19 should discontinue home isolation after the resolution of fever without intake of fever-reducing medications, improvement in respiratory symptoms and subsequent negative results of a molecular assay for COVID-19 from at least 2 consecutive nasopharyngeal swab specimens collected 24 or more hours apart.

A person without symptoms and positive COVID-19 should discontinue home isolation when at least 7 days have passed since the date of their first positive COVID-19 diagnostic test and have had no subsequent illness.

Equipments to be used for COVID positive dialysis patients must be kept separately. Equipments such as stethoscope, thermometers, oxygen saturation probes and blood pressure cuffs must be separated and disinfected using appropriate alcohol based disinfectant in between.

GUIDENCE FOR PPE CONSERVATION AND USE

PPE kit has a major role in COVID-19 management. PPE conservation and use has a very important role in health care delivery in times of COVID-19. PPE includes surgical mask, eye goggles, face shield, N95 respirator

mask and isolation gown. It is designed so as to ensure safety of all health care personnel. Universally it is advised to use surgical masks for patients and health care personnel. Al the health care personnel must be provided required education and training about using PPE and proper technique of donning and doffing of the PPE. An updated PPE inventory should be kept for all dialysis faculties. The administration should keep track of all PPE use and its needs and should always provide sufficient supplies. For suspected and confirmed COVID-19 cases standard droplet and contact precaution should be applied. If the care should be given for a COVID positive patient within 6 feet then the health care personnel should wear an isolation gown, N95 masks or respirator and an eye protection goggles. For non direct care of patients eye protection, surgical mask and a laboratory coat is sufficient. Home dialysis patient must be treated via telephone by the physician to avoid further contact and exposure. For inpatient with covid close examination and visitors should be avoided to minimize the risk and for conserving PPE.

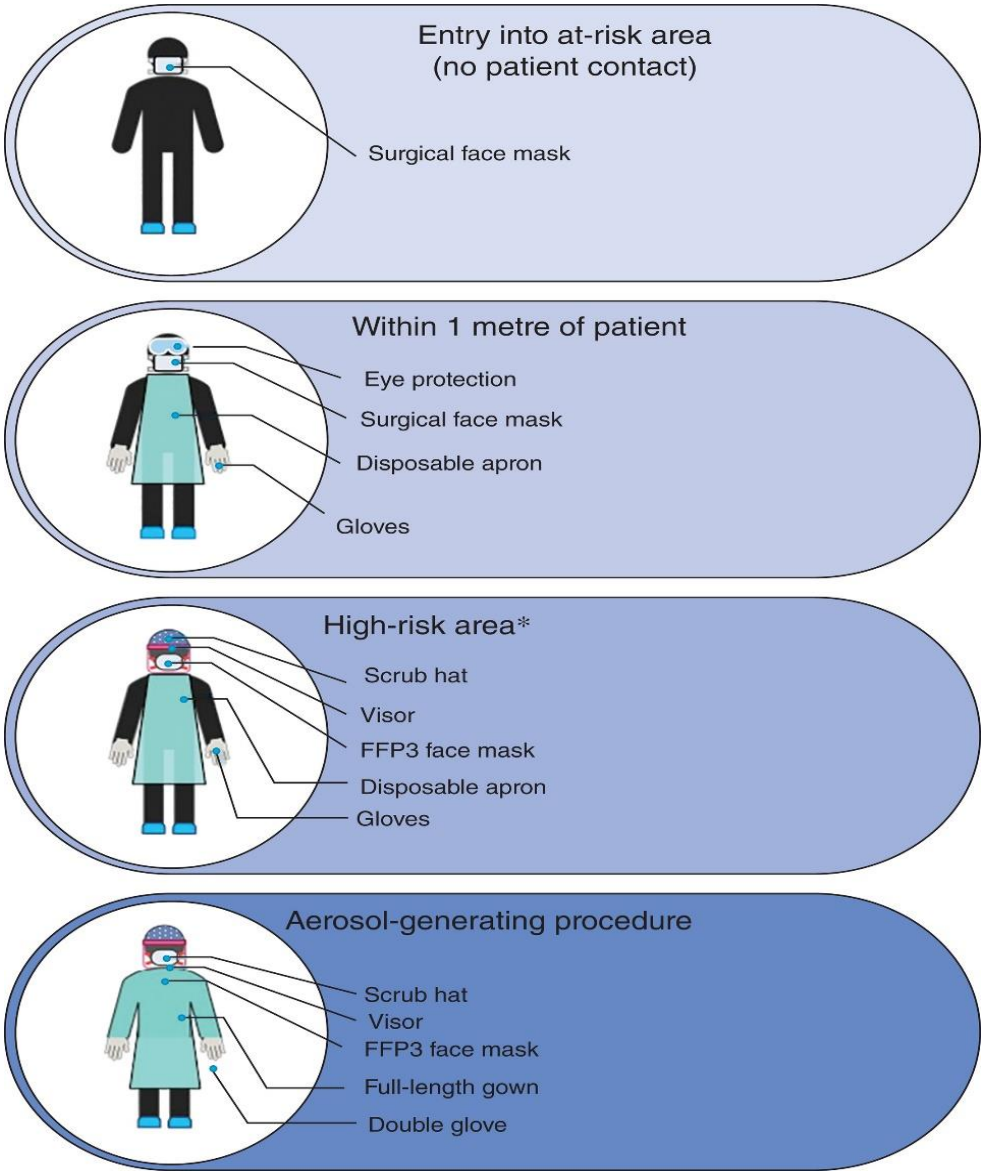


Figure 4: use of PPE according to the exposure of COVID -19.

DIALYZING PATIENTS WITH COVID-19

Separate rooms should be allocated for suspected or confirmed hemodialysis patients. If separate rooms are not available the patient must either be hemodialysed at the corner of the room 6 feets away from other patients or else hemodialysed at last. The same staff must attend all the suspected or confirmed COVID -19 hemodialysis patient to avoid cross contamination and infection. Additional nursing and other health professionals should be managed prior to avoid shortage of staff in emergency. Disinfection of all the equipments and other accessories must be done compulsorily. If there is a large inflow of outpatients with COVID infection for undergoing hemodialysis then a separate unit may be set up for giving accurate treatment and to reduce exposure to uninfected HD population. If required doctors must be

available at outpatient dialysis centre when required. All the dialysis staffs must be trained to work at and provide adequate treatment at outpatient dialysis centre. The staffs must be properly trained to take care both outpatient and inpatient HD patients, they must be trained to take nasopharyngeal swab specimens properly. Maintain an outpatient dialysis unit may reduce the rush of HD patients in the hospitals. Proper education and training must be given to all the COVID HD patients and family members about practicing self-quarantine at home and proper treatment associated with self-quarantine. The bystanders and other family members must be monitored for any sort of symptoms. For inpatients and other hemodialysis patients must be treated under proper surveillance and precaution which may include using eye protection, isolation gowns and N95 mask. Isolation and discontinuation of isolation may be determined using symptom based strategy and test based strategy. When the inpatients are ready to be discharged they must be allocated to outpatient dialysis unit. All the health care personnels must be aware of the appropriate discharge planning for the vulnerable patients. Discharges must be made only after resolving of the symptoms. If in any case discharge has to be done before resolving of the symptom the patient must maintain social distancing everywhere. Arrangements must be done for HD at any other outpatient dialysis unit. If the symptoms does not resolve after protocol based isolation the patient must move for yet another 14 days of isolation.

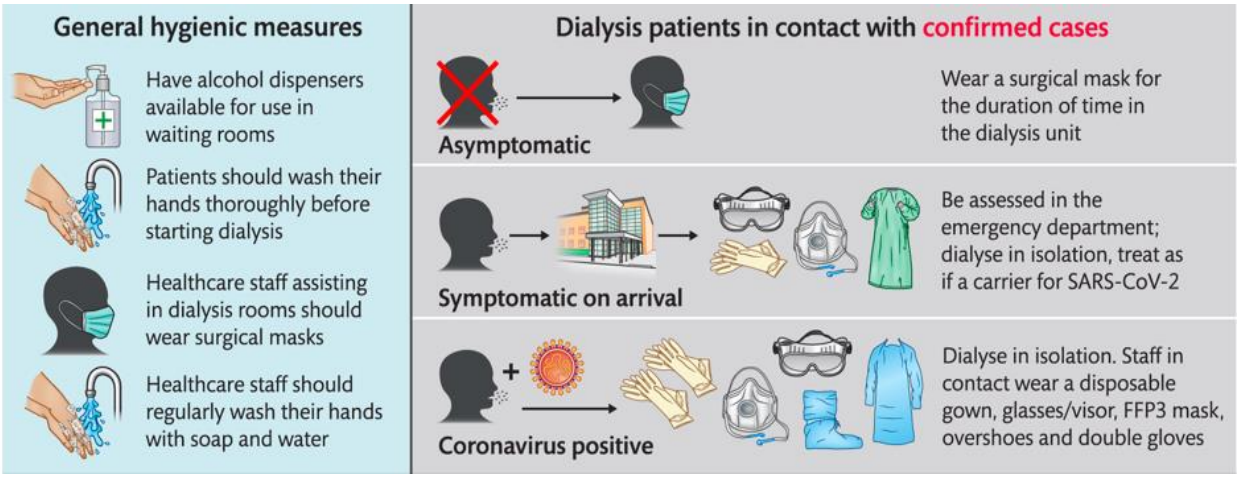


Figure 5: General measures to be taken by the patient to reduce the risk.

EFFECT ON DIALYSIS FACILITIES AND PATIENTS DUE TO COVID-19

COVID -19 has affected both dialysis facilities and patient life drastically. It had forced the hospital faculities and other other health care authorities to arrange different dialysis units and to arrange a huge number of staffs to appoint for various dialysis shifts. The faculties must ensure staff availability for both non-COVID and COVID patients undergoing dialysis. Transportation is yet another important challenge that the patients have to face. The disease has also increased psychological stress or mental stress to both patients and caregivers about the disease condition and the risk of being infected. It make the situation very complicated as hemodialysis is a procedure where we cannot maintain social distancing all the time. The mental stress is yet another consequence of COVID that both patients and the caregivers have to face.

Figure 6: methods to reduce transmission of COVID-19 in hemodialysis centers.

CONCLUSION

COVID-19 is a pandemic that has been faced by the whole nation for a while and it is well clear that COVID-19 has drastic effect on hemodialysis patient both in morbidity mortality and hemodialysis frequency. As the saying goes "prevention is better than cure", all steps must be taken inorder to reduce the risk of getting infected for the HD patients. Suitable measures such as social distancing, wearing mask gloves, proper sanitization and use of disinfectant should be practiced. The HD patients must be given required attention and care as they are vulnerable to the disease. Not only the patients the health care personnel's must also take the required precaution and ensure safety of both patients and themselves and thus everyone should take at most care until and unless we get rid of the pandemic completely.

REFERENCE

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med., Feb., 2020; 382(8): 727–33.
2. Wu JT, Leung K, Leung GM. Now casting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. Lancet, Feb., 2020; 395(10225): 689–97.
3. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet. 2020, Pub ahead of print.
4. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al.; China Medical Treatment Expert Group for Covid-19. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020, Epub ahead of print.
5. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med. 2020, Epub ahead of print.
6. Shi Y, Yu X, Zhao H, Wang H, Zhao R, Sheng J. Host susceptibility to severe COVID-19 and establishment of a host risk score: findings of 487 cases outside Wuhan. Crit Care, Mar., 2020; 24(1): 108–2833.
7. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med., 2020; 382(18): 1708-1720.
8. Nick W, Amanda K, Lucy Telfar B, Michael GB. Case-fatality risk estimates for COVID-19 calculated by using a lag time for fatality. Emerg Infect Dis J., 2020; 26(6): 1339-1441.
9. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. JAMA, 2020; 323(13): 1239-1242.
10. Centers for Disease Control and Prevention. Chronic Kidney Disease Surveillance System website. Vol 20202019.Accessed October 23, 2020
11. Tang B, Li S, Xiong Y, et al. COVID-19 pneumonia in a hemodialysis patient. Kidney Med., 2020; 2(3): 354-358.
12. Dialysis should continue despite COVID-19; CDC gives guidance. Vol 20202020. https://www.medscape.com/viewarticle/ 926720. Accessed October 23, 2020.
13. Watnick S, McNamara E. On the frontline of the COVID-19 outbreak. CJASN, 2020; 15(5): 710-713.
14. Guan W-J, Ni Z-Y, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Eng J Med., 2020; 382(18): 1708–1720. doi:10.1056/NEJMoa2002032
15. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet, 2020; 395(10223): 497–506. doi:10.1016/S0140-6736(20)30183-5
16. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet, 2020; 395(10229): 1054–1062. doi:10.1016/S0140-6736(20)30566-3
17. Wang D, Hu B, Hu C, et al. Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. JAMA, 2020; 323(11): 1061–1069. doi:10.1001/jama.2020.1585
18. Wang X, Fang X, Cai Z, et al. Comorbid Chronic Diseases and Acute Organ Injuries Are Strongly Correlated with Disease Severity and Mortality among COVID-19 Patients: a Systemic Review and Meta-Analysis. Research, 2020; 2020: 2402961. doi:10.34133/2020/2402961
19. Kalantar-Zadeh K, Block G, Humphreys MH, Kopple JD. Reverse epidemiology of cardiovascular risk factors in maintenance dialysis patients. Kidney Int., 2003; 63(3): 793–808. doi:10.1046/j.1523-1755.2003.00803.x
20. Huang W, et al. Decreased serum albumin level indicates poor prognosis of COVID-19 patients: hepatic injury analysis from 2,623 hospitalized cases. Science China Life., 2014.